

Discovery of three lepidopterous leaf-miners on *Vaccinium vitis-idaea* from Hokkaidô, Japan (Nepticulidae, Gracillariidae and Coleophoridae)

Tosio KUMATA¹⁾ and Masahiko NAKATANI²⁾

¹⁾ Laboratory of Systematic Entomology, Faculty of Agriculture, Hokkaidô University, Sapporo, 060 Japan.

²⁾ 3-18-10, Sirakabadai, Kusi-ro-si, Hokkaidô, 085 Japan.

Abstract *Ectoedemia (Fomoria) weaveri* (Stainton) (Nepticulidae), *Phyllonorycter junoniella* (Zeller) (Gracillariidae) and *Coleophora glitzella* Hofmann (Coleophoridae) are recorded from Japan for the first time with their redescrptions. The larvae of these species make similar blotch-mines in leaves of *Vaccinium vitis-idaea* Linné (Ericaceae).

Key words *Ectoedemia (Fomoria) weaveri*, *Phyllonorycter junoniella*, *Coleophora glitzella*, leaf-miner, *Vaccinium vitis-idaea*, Japan.

Although many species of leaf-miners are known to attack *Vaccinium vitis-idaea* (Ericaceae) in Europe (Hering, 1957), no species are so far recorded from Japan. Recently we have found lepidopterous larvae making blotch-mines in tiny leaves of *V. vitis-idaea* during our entomological surveys on moorlands distributed in eastern Hokkaidô, Japan. The adults emerged from these larvae are classified in three species; they are, *Ectoedemia (Fomoria) weaveri* (Stainton) of the family Nepticulidae, *Phyllonorycter junoniella* (Zeller) of the Gracillariidae and *Coleophora glitzella* Hofmann of the Coleophoridae. These species are widely distributed in Europe in association with *V. vitis-idaea*. On this occasion we wish to record them from Japan and to redescrbe briefly hereinafter, with illustrations of the moths and genitalia.

Before going further, we wish to acknowledge to the authorities of the Educational Commity of Nemuro City in giving us the permission to make surveys at Yururi-tô, a small island located on the Pacific coast near Hanasaki Port, Nemuro City, Hokkaidô. We are most indebted to Mr N. Kondo of the Preparative Office of Nemuro Municipal Museum, Mr Y. Hirama and the other members of Kusi-ro Kontyû Dôkôkai [Kusi-ro Insect-lovers' Society] for their kindness in various ways during our surveys, and also to Mr Y. Sakamaki of Hokkaidô University for his kindness in offering material used in this paper.

Family Nepticulidae

Ectoedemia (Fomoria) weaveri (Stainton) (Figs 1 (B-C), 2, 3 (A-B), 7 (C-D))

Nepticula weaveri Stainton, 1855: 49.

Fomoria weaveri: Beirne, 1945: 209, fig. 81 (male genitalia); Emmet, 1976: 205, pl. 12, fig. 40 (adult moth).

Ectoedemia (Fomoria) weaveri: Johansson *et al.*, 1990: 288, figs 146-148 (adult moths), 197 (wing venation), 425, 426 (male genitalia), 780 (female genitalia).

Specimens examined. 1 ♂ 2 ♀. 1 ♂ 1 ♀, Habomai, Nemuro, Hokkaidô, em. 17-20. vii. 1994, *ex Vaccinium vitis-idaea*, M. Nakatani leg.; 1 ♀, Otiisi, Nemuro, em. 24. vii. 1994, *ex V. vitis-idaea*, M. Nakatani leg.

The specimens mentioned above are well identical with the redescrption, with many figures, of *E. (F.) weaveri* given by Johansson *et al.* (1990).

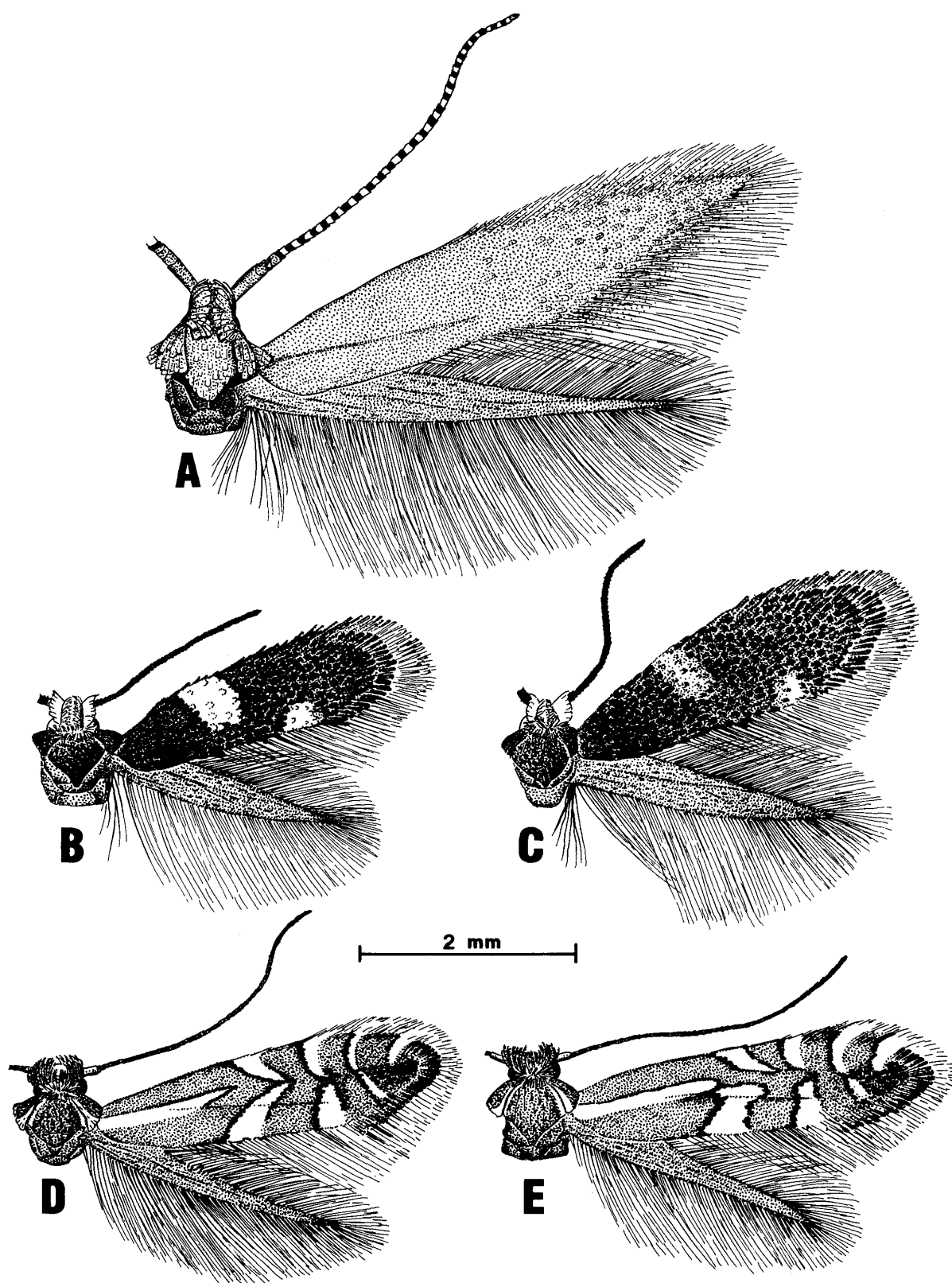


Fig. 1. Wing marking. A: *Coleophora glitzella* Hofmann, female. B: *Ectoedemia (Fomoria) weaveri* (Stainton), female. C: *Ditto*, male. D: *Phyllonorycter junoniella* (Zeller), female. E: *Ditto*, male.

♂. Length of fore wing: 3.1 mm. Head brownish; face a little paler, yellowish brown. Antenna about half as long as fore wing, filiform, dark fuscous or blackish, with an expanded scape or eyecup yellowish white. Palpi dark fuscous. Thorax blackish fuscous dorsally and greyish fuscous ventrally. Legs greyish fuscous, but much darker in fore leg and much paler in hind tarsus. Fore wing blackish fuscous, with an outwardly oblique, whitish costal blotch at basal one-third, and a similar dorsal blotch at tornus, the costal blotch being a little larger than the dorsal; cilia greyish white, with a wide, blackish median fringe line around apex of wing. Hind wing and its cilia grey, becoming paler towards base. Colour pattern of abdomen not observed.

Genitalia as in Fig. 2. Tegumen triangular, with a pointed pseudouncus covered with a few fine setae. Uncus with narrow lateral arms and a median process, the median process being a little widened distally and having a pair of lateral setae. Gnathos Y-shaped, with central process long and sharply pointed apically. Ventral plate of vinculum produced posteriorly into a quadrate, juxta-like lobe. Valva narrow, straight, tapering towards pointed apex, sparsely covered with fine setae; transtilla complete, arcuate, with a pair of narrow processes at costal bases of valvae. Aedeagus about 1.5 times as long as valva, thickly bar-shaped, slightly constricted medially, with a ventral pair of long straight, pointed carinae and a dorsal pair of long, hook-shaped carinae; vesica with many spiculate cornuti.

♀. A little smaller than male, 2.6-2.8 mm in length of fore wing. Colour pattern as in male, but costal and dorsal blotches of fore wing well distinct and brilliantly silvery white in colour.

Genitalia as in Fig. 3 (A-B). Papilla analis slender, covered with 16-19 setae, with apophysis posterioris slender, long, and slightly widened basally. Eighth abdominal segment consisting of narrow dorsal and ventral bands; apophysis anterioris slender as in apophysis posterioris, but much shorter. Vestibulum large, well sclerotized, with five or more irregularly sclerotized plates or bars. Ductus bursae short, rather thick, lined with pectinations; corpus bursae long, with a pair of long signa, which are covered with three to four rows of pentagonal pattern. Ductus spermathecae with two and half

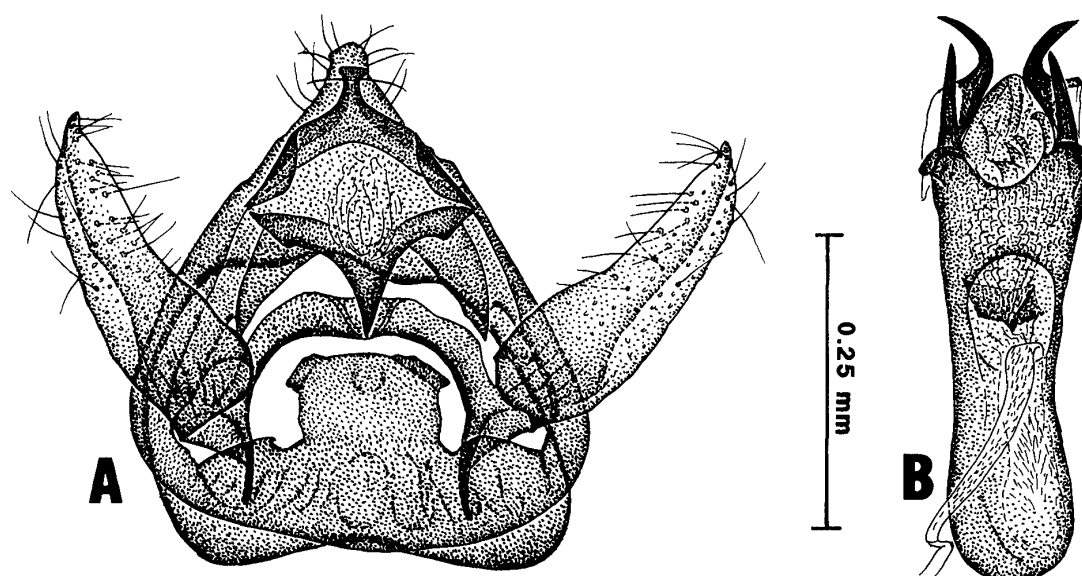


Fig. 2. *Ectoedemia (Fomoria) weaveri* (Stainton). A: Male genitalia in ventral view, aedeagus removed (Gen. sl. no. Npt-7). B: Aedeagus in ventral view (*ditto*).

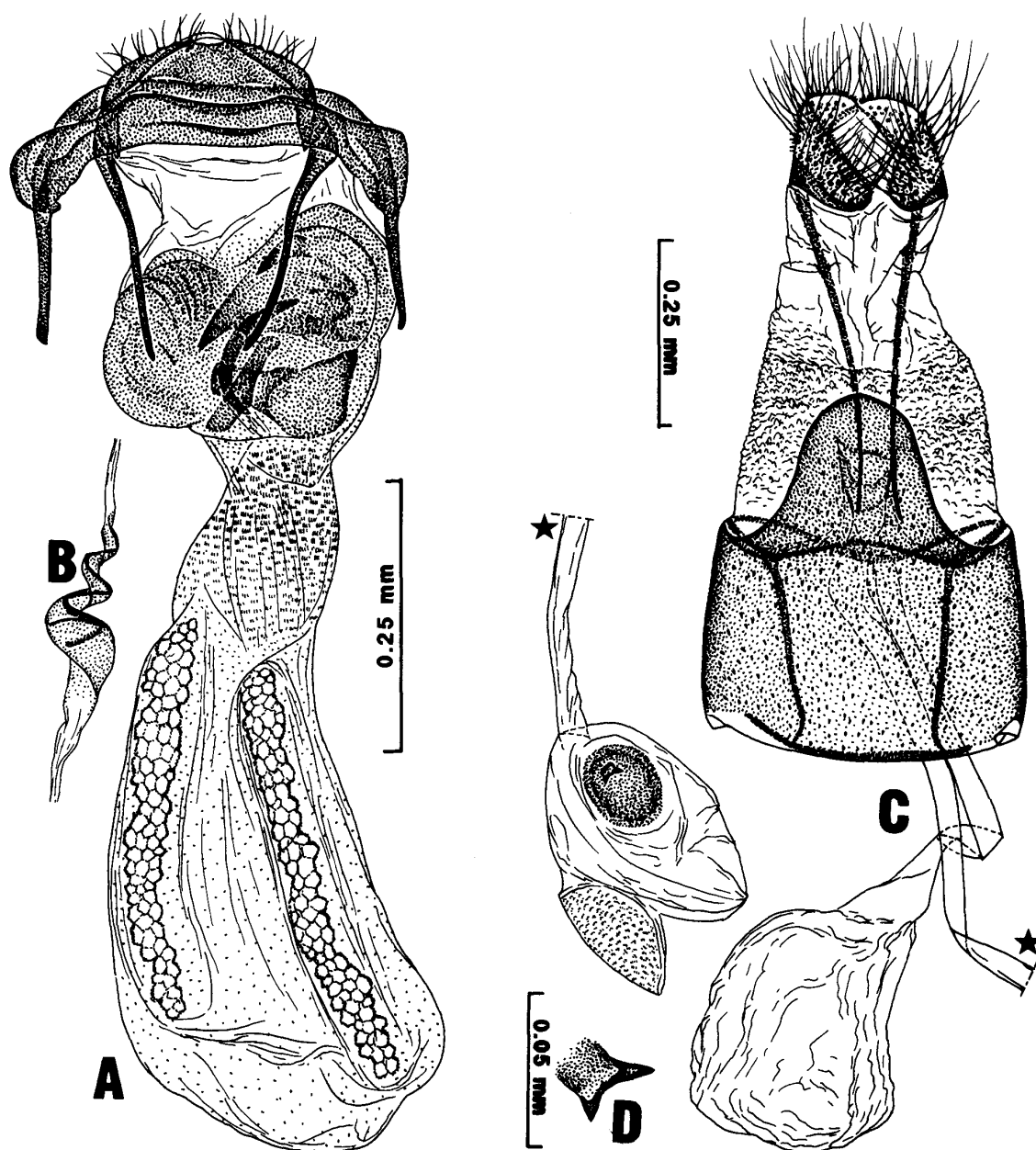


Fig. 3. *Ectoedemia* (*Fomoria*) *weaveri* (Stainton) (A-B) and *Phyllonorycter junoniella* (Zeller) (C-D). A: Female genitalia in ventral view (Gen. sl. no. Npt-19). B: Ductus spermathecae (*ditto*). C: Female genitalia in ventral view (Gen. sl. no. Grc-6011). D: Signum enlarged (*ditto*).

convolutions

Food plant. *Vaccinium vitis-idaea* Linné (Ericaceae).

Mine. Egg found on lower surface of leaf of the food plant. But early mine always occurring on the upper surface, narrowly linear, and irregularly traversing or encircling the leaf. Thereupon, the mine abruptly leading into an irregular blotch made in centre of the leaf, the blotch sometimes occupying whole the inner part of the leaf. The leaf containing a fully matured mine is swollen on both the sides, especially on the upper side into a dome-like, round roof. The cocoon is located within the dome-like mine-cavity,

yellowish in colour and long ellipsoidal in shape.

Distribution. Widely distributed in northern parts of Eurasia from England to Central Siberia, and Japan (new record).

Remarks. There are different opinions about the treatment of the taxon, *Fomoria* Beirne, 1945, as a good genus or a subgenus of the genus *Ectoedemia* Busck, 1907. In this paper we adopt the system proposed by Johansson *et al.* (1990).

The present species is very similar to *Ectoedemia (Fomoria) hypericifolia* (Kuroko) (**comb. nov.**) described from Kyûsyû, Japan, in colour pattern and male genitalia, but is easily distinguished from the latter by the larger size (in *E. (F.) weaveri*, the length of fore wing is more than 2.5 mm, while in *E. (F.) hypericifolia* less than 2 mm), by the simple valva without a strong seta at the middle, and by the different food plants (*E. (F.) hypericifolia* feeds on *Hypericum erectum* (Hypericaceae)).

Family Gracillariidae

Phyllonorycter junoniella (Zeller) (Figs 1 (D-E), 3 (C-D), 4, 7 (A-B))

Lithocolletis junoniella Zeller, 1846: 215; Pierce et Metcalfe, 1935: 71, pl. 43 (male and female genitalia); Kuznetsov, 1981: 255, fig. 156 (1) (male genitalia).

Phyllonorycter junoniella: Watkinson, 1985: 322, pl. 12, fig. 16 (adult moth).

Lithocolletis vacciniella Stainton, 1855: 48.

Specimens examined. 1 ♂ 5 ♀. JAPAN: 2 ♀, Yururi-tô, Nemuro, Hokkaidô, em 9-12. vii. 1993, ex *Vaccinium vitis-idaea*, T. Kumata leg.; 2 ♀, Habomai, Nemuro, Hokkaidô, em. 12. vii. 1994, ex *V. vitis-idaea*, M. Nakatani leg.; 1 ♂, Mt Yôtei (alt. 500 m), Kuttan-tyô, Siribesi, Hokkaidô, 15. vii. 1992, Y. Sakamaki leg. NORWAY: 1 ♀, FIS 28, AK AS, em. 29. iv. 1989, ex *V. vitis-idaea*, L. Aarvik leg., determined as *Phyllonorycter junoniella* by L. Aarvik.

♂ & ♀. Length of fore wing: a little smaller than the European material examined, 2.5-3.2 mm. Head with tuft yellowish brown, mixed with whitish hairs posteriorly; face and palpi whitish. Antenna greyish above, whitish beneath; scape yellowish, with white hairy pecten. Thorax including tegulae golden brownish, with a pair of narrow, whitish lines along inner margins of tegulae. Legs greyish white, darkened in fore tibia and tarsus wholly and in hind tibia apically. Fore wing clearly orange brown; a white mediobasal streak narrow, straight, extending to basal two-fifths of wing, narrowly margined with fuscous along upper edge; four costal and three dorsal strigulae clearly white, all margined with fuscous inwardly, and first pair and second dorsal also margined outwardly; costal strigulae arranged nearly equidistantly from middle to subapex of wing, nearly same in size, the first acutely oblique outwardly, and the others almost vertical and arc-shaped; first dorsal long sickle-shaped, oblique outwardly, opposite to first costal and nearly meeting to the latter to form a sharply acute angle; second dorsal triangular, opposite to second costal, with its acute tip nearly meeting with that of second costal; third dorsal joining with third costal to form a narrow fascia curving inwardly; a black bar at apex of wing, sometimes extending to the third pair of strigulae; a blackish fringe line running around apex of wing from third costal to third dorsal; cilia outside this line and on dorsal margin whitish. Hind wing grey, with cilia paler. Colour of abdomen not observed.

Male genitalia as in Fig. 4. Tegumen elongately conical, sparsely squamose dorsally; tuba analis membranous, not spinulose. Vinculum moderate in length, round anteriorly, without prominent saccus. Valva nearly as long as tegumen and a little shorter than

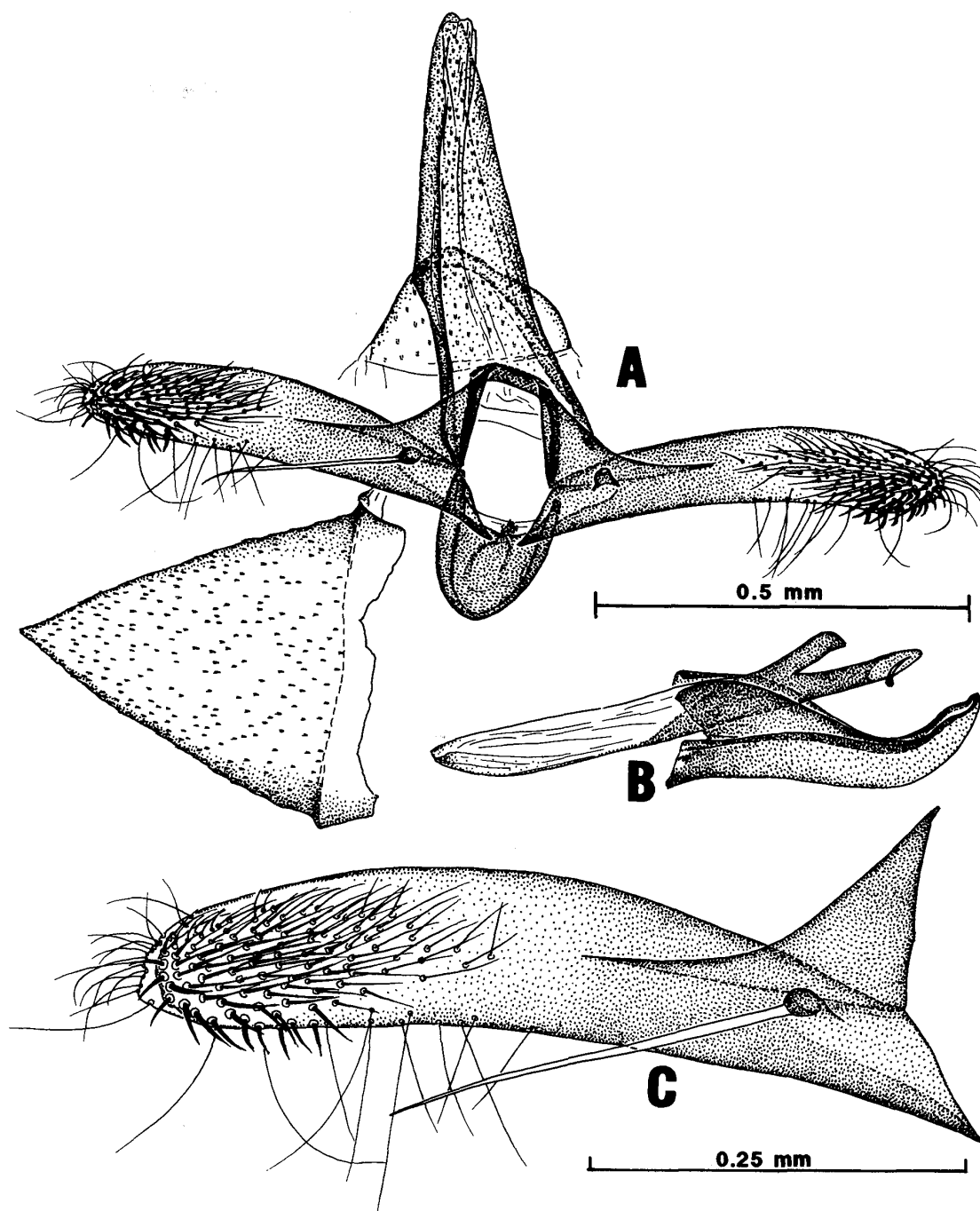


Fig. 4. *Phyllonorycter junoniella* (Zeller). A: Male genitalia in caudal view, aedeagus removed (Gen. sl. no. Grc-6241). B: Aedeagus and juxta (*ditto*). C: Left valva enlarged (*ditto*).

aedeagus, moderate in width with nearly parallel sides, slightly arched upwardly, round apically, covered with rather dense setae on apical half, some apical and dorsal setae becoming much thicker and shorter; a long, straight, filament-like seta stretched from top of a small projection situated on disc near base, and reaching apical one-fourth of valva; transtilla complete, slender throughout, arcuate. Juxta long conical, about two-thirds length of aedeagus, slightly bent at apical one-third. Aedeagus straightly bar-shaped, with a thick dorsal projection and a minute ventral barb; the dorsal projection projected at apical one-fourth of aedeagus, very slightly narrower and about one-ninth

length of aedeagus. Flap-like eighth sternite large triangular, with an acute apex.

Female genitalia as in Fig. 3 (C-D). Papilla analis moderate in length, covered with slender setae and spinules as usual; apophysis posterioris slender, very long, about twice as long as apophysis anterioris. Eighth abdominal segment covered with irregular and dense wrinkles, nearly membranous except on cephalic margin where it is strongly sclerotized to form a sinuate, narrow ring; apophyses anteriores originated from ventrolateral portions of this ring, narrow, nearly straight. Seventh abdominal sternite with a large, tongue-shaped caudal lobe. Ostium, ductus and corpus bursae weakly membranous; there are two types of signa: one is a weakly sclerotized elliptical plate, with a pair of tiny projections, and the other an elliptical area covered by pectinations.

Food plant. *Vaccinium vitis-idaea* Linné (Ericaceae).

Mine. Egg laid on the lower surface of the leaf of the food plant. The mine started in a lower blotch-gallery, and expanded it to occupy almost whole the surface of the leaf according to larval growth. Thereupon, the parenchymal tissue attached to the upper surface is incompletely eaten, giving a mottled appearance. When fully matured, the lower epidermis of the leaf at mining part is strongly contracted by silk, thus the upper side of the leaf is elevated into a tent-like roof. Pupation takes place inside the mine-cavity within a roughly spun, whitish cocoon.

Distribution. North Europe including England, mountain areas of Central Europe, and Japan (new record).

Remarks. The Japanese specimens examined are slightly smaller than one European specimen of *P. junoniella*, but the colour-pattern and genital structures show that they are identified as *P. junoniella*.

This species is distinguished from the known Japanese members of the genus *Phyllonorycter* by the peculiar shape of the aedeagus in male and by the large caudal lobe of the seventh abdominal sternite in female.

The mine of this species is rather similar to that of the preceding *Ectoedemia* (*Fomoria*) *weaveri* in appearance, but may be distinguished by the following key.

1. Mine usually with a trace of young linear gallery on the upper surface of leaf; upper surface of mined leaf elevated into a round dome-like roof; lower surface flat or swollen, without any wrinkles *Ectoedemia* (*Fomoria*) *weaveri* (Stainton)
- Mine without any trace of linear gallery; upper surface of mined leaf elevated into a tent-like longitudinal roof; lower surface strongly contracted, with a few longitudinal wrinkles *Phyllonorycter junoniella* (Zeller)

Family Coleophoridae

Coleophora glitzella Hofmann (Figs 1 (A), 5, 6, 7 (E))

Coleophora glitzella Hofmann, 1869: 119; Meyrick, 1927: 752; Toll, 1962: 632, pl. 5K (fig. 57) (Head), 18A (70-72) (abdomen), 8M (53) (male genitalia), 7W (43) (female genitalia), 28S (265) (larval case). *Eupista glitzella*: Toll, 1952: 84, pls 5 (38), 23 (197), 38 (127).

Specimens examined. 1 ♂ 2 ♀, Otiisi, Nemuro, Hokkaidō, em. 12-17. vii. 1994, ex *Vaccinium vitis-idaea*, M. Nakatani leg.

♂ & ♀. Length of fore wing: 5.2-5.8 mm. Head light greyish ochreous; face a little lighter than head. Labial palpus greyish white, a little darker outside; second segment about twice as long as diameter of eye, with a short apical tuft below; third segment

about two-thirds as long as the second. Antenna white, annulated with black; scape and two or three basal segments of flagellum light greyish ochreous. Thorax greyish ochreous. Legs light greyish ochreous, a little darker outside, with fore and mid tarsi with a pale apical ring in each segment and hind tarsus with a darker apical ring in each segment. Fore wing and its cilia unicoloured, greyish ochreous, tinged with grey more strongly in male, without any fringe-line. Hind wing and its cilia greyish, with ochreous reflections. Abdomen ochreous brown dorsally, light greyish ochreous ventrally, with a whitish anal tuft.

Male genitalia as in Fig. 5. Tegumen elongate-quadrate in ventral aspect, slightly constricted near apex; gnathos moderate in size, globular. Valva small, semioval; valvula large, widely round in apical and ventral margins, sinuate and nearly vertical to tegumen in costal margin in slide with expanded valvae, moderately setose on inner surface; sacculus narrow, heavily sclerotized ventrally, nearly parallel with ventral margin of valvula, with an acute apex reaching middle of valva. Vinculum strongly sclerotized in a V-shape, narrowed at median corner. Anellus consisting of well-sclerotized four processes: a ventrocephalic process between sacculi narrow, a dorsocephalic interior process a little longer than wide, a dorsocaudal process very long and acutely tapering apically, and a ventrocaudal process short, triangular and nearly as long as ventrocephalic process. Aedeagus simple, membranous except on ventromedian area, with a bundle of ten to twelve thorn-like cornuti placed dorsally of this sclerotized part.

Female genitalia as in Fig. 6. Papilla analis moderate in size and length, with a round caudal margin, setose and spinulose rather densely; apophysis posterioris slender, straight, about twice as long as apophysis anterioris. Eighth abdominal segment well sclerotized, nearly as long as apophysis anterioris, sparsely setose on caudal margin, with a large, circular caudoventral concave of ostium bursae. Ductus bursae with its basal one-sixth narrow, weakly sclerotized, with a well-sclerotized longitudinal keel; the next

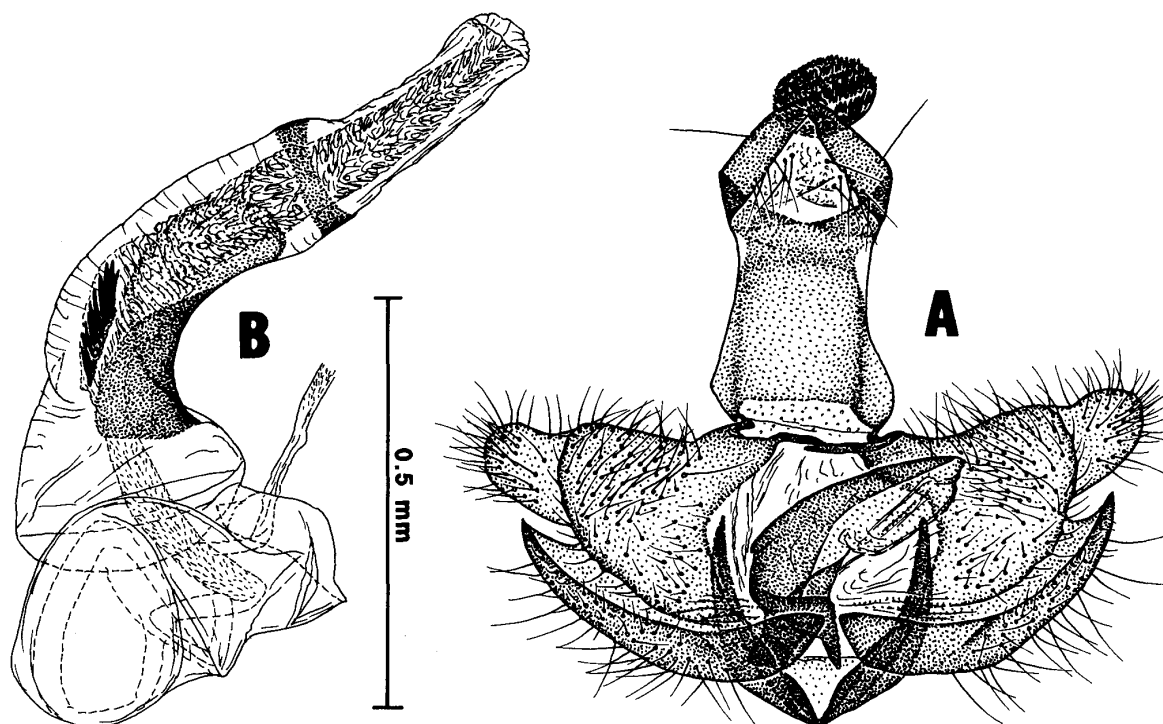


Fig. 5. *Coleophora glitzella* Hofmann. A: Male genitalia in ventral view, aedeagus removed (Gen. sl. no. Clp-5). B: Aedeagus (*ditto*).

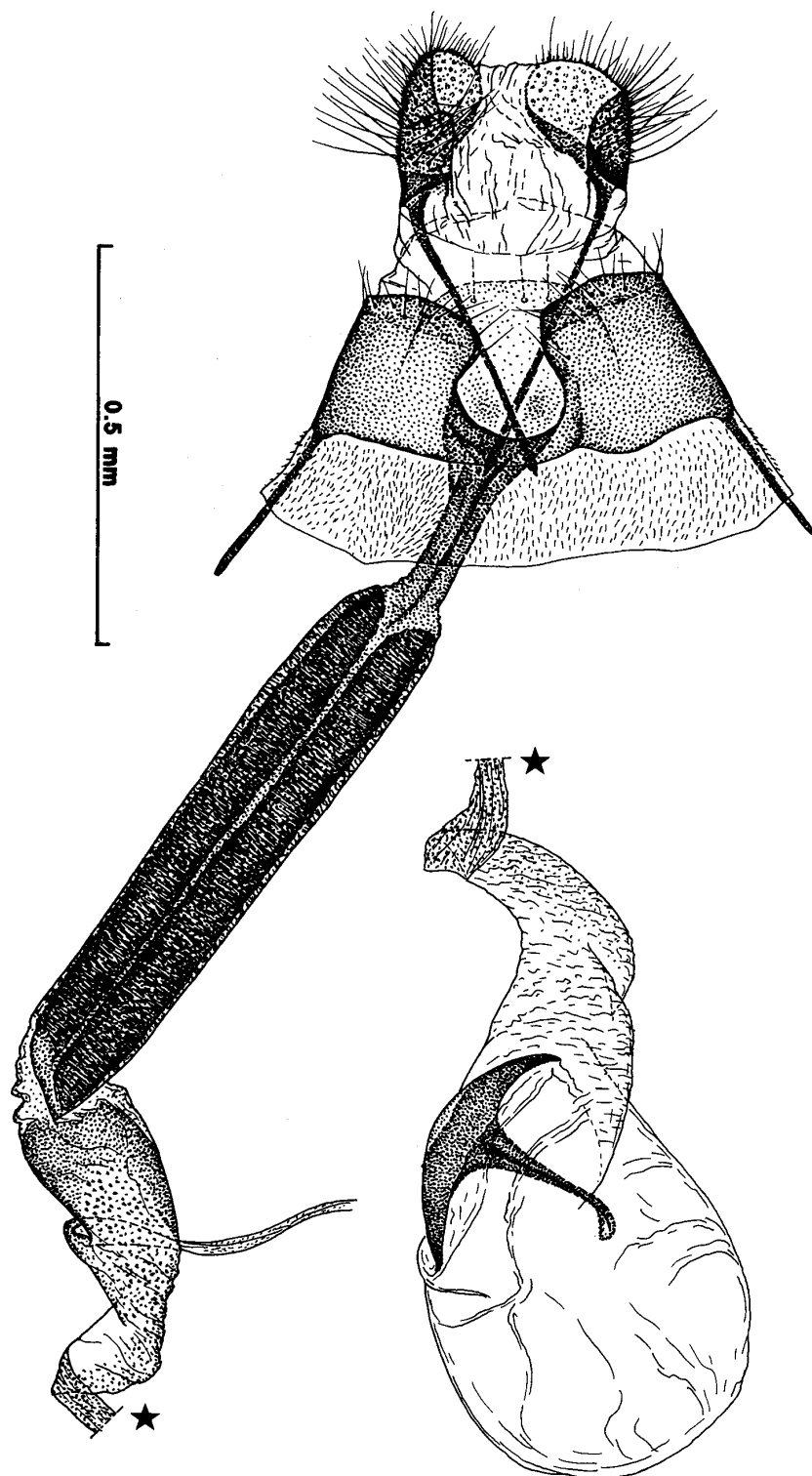


Fig. 6. *Coleophora glitzella* Hofmann. Female genitalia in ventral view (Gen. sl. no. Clp-6).

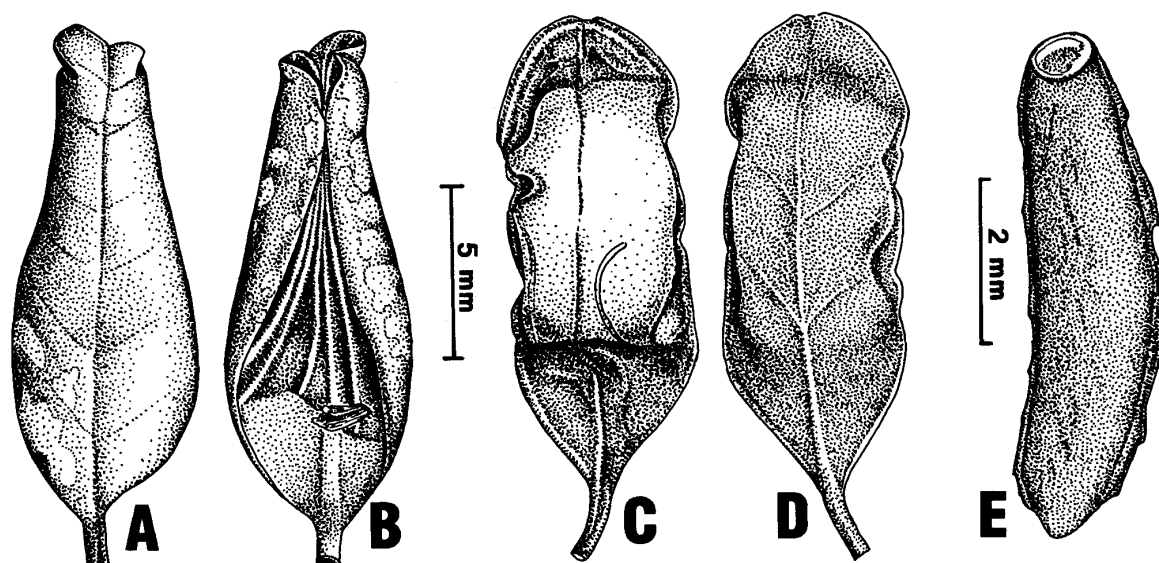


Fig. 7. Leaf-mines (A-D) and larval case (E). A: Leaf of *Vaccinium vitis-idaea* mined by *Phyllonorycter junoniella* (Zeller) (upper side). B: *Ditto* (lower side). C: Leaf of *V. vitis-idaea* mined by *Ectoedemia (Fomoria) weaveri* (Stainton) (upper side). D: *Ditto* (lower side). E: Leaf-case of last instar larva of *Coleophora glitzella* Hofmann.

three-sixths of ductus bursae straight, well sclerotized and densely spiculate; beyond this spiculation ductus bursae weakly sclerotized or densely spinulate, with ductus seminalis arising from thickened basal area of this part. Corpus bursae small, pyriform, with a large, T-shaped signum. Intersegmental membrane between eighth and seventh abdominal segments densely spinulate.

First to seventh abdominal tergites of both sexes with a pair of spiniferous patches on each tergite; the patches on first tergite elongate-oblong and covered by 7 to 10 spines in male and 10 to 15 ones in female, those on second to sixth tergites about twice as long as those on the first, each with 30 to 40 spines, and those on seventh tergite very minute, with 2 to 4 spines.

Food plant. *Vaccinium vitis-idaea* Linné (Ericaceae).

Mine. The mine of this species is similar to the most species of the genus *Coleophora*, being a semitransparent blotch, usually orbicular in shape, either with a minute round hole at the centre of the lower surface or with an ellipsoidal larval case hanging from the corresponding situation.

The larval case (Fig. 7 (E)) is 6-8 mm in length of mature condition, classified in the leaf-case of Toll (1952), elongate-ellipsoidal, somewhat flattened laterally, with upper and lower keels, dark brown in colour.

Distribution. North and Central Europe including England, and Japan (new record).

Remarks. The identification of the present specimens is tentative. The Japanese specimens are also somewhat related to the description and illustrations of *Coleophora murinella* Tengström given by Toll (1962). For further identification the direct comparison between the Japanese and European materials will be necessary.

The mine of this species is very easily distinguished from those of the preceding two by the flat and semitransparent condition with a round hole on the lower side.

References

- Beirne, B. P., 1945. The male genitalia of the British Stigmellidae (Nepticulidae) (Lep.). *Proc. R. Ir. Acad.* **50** (B): 191-218.
- Emmet, A. M., 1976. Nepticulidae. In Heath, J. ed., *The Moths and Butterflies of Great Britain and Ireland* **1**: 171-267. Blackwell Scientific Publication, Oxford.
- Hering, E. M. 1957. *Bestimmungstabellen der Blattminen von Europa*. 1185 pp., 86 pls. Dr W. Junk, Gravenhage.
- Hofmann, O., 1869. Beitrag zur Naturgeschichte der Coleophoren. *Stettin. ent. Ztg* **30**: 107-122, 187-190.
- Johansson, R., Nielsen, E. S., Nieuwerkerken, E. J. van and B. Gustafsson, 1990. The Nepticulidae and Opostegidae (Lepidoptera) of North West Europe. *Fauna entomologica scand.* **23**: 1-739.
- Kuroko, H. 1982. Nepticulidae. In Inoue, H., Sugi, S., Kuroko, H., Moriuti, S. and A. Kawabe, *Moths of Japan* **1**: 49-50, and **2**: pls 1 and 262. Kodansha, Tokyo.
- Kuznetsov, V. I., 1981. Gracillariidae (Lithocolletidae). In Medvedeva, G. S. ed., *Key to the Insects of European Part of USSR* **4**(2): 149-311.
- Meyrick, E., 1927. *A revised Handbook of British Lepidoptera*. vi, 914 pp. Second reprinted in 1970. E. W. Classey Ltd., Hampton.
- Pierce, F. N. and J. W. Metcalfe, 1935. *The Genitalia of tineid Family of the Lepidoptera of the British Isles*. xxii, 114 pp., 48 pls. Reprinted in 1968. E. W. Classey Ltd., Hampton.
- Stainton, H. T., 1855. Lepidoptera: The new British species in 1854. *Entomologist's Annu.* **1855**: 62-72, frontispiece.
- Toll, S., 1952. Rodzina Eupistidae Polski. *Mater. Fizjogr. Kraju* **32**: 1-292, 38 pls.
- , 1962. Materialien zur Kenntnis der paläarktischen Arten der Familie Coleophoridae (Lepidoptera). *Acta zoologica cracov.* **7**: 577-719, 133 pls.
- Watkinson, I.A., 1985. Lithocolletinae. In Heath, J. ed., *The Moths and Butterflies of Great Britain and Ireland* **2**: 294-360. Blackwell Scientific Publication, Oxford.

摘 要

北海道で発見したコケモモに潜葉する小蛾類 3 種 (久万田敏夫・中谷正彦)

コケモモの葉に潜る小蛾類は、ヨーロッパからは多数の種類が知られているが、これまでわが国からの記録はない。筆者らは北海道東部に散在する湿地帯の蛾類を調べる過程で、コケモモから 3 種の潜葉性小蛾類を発見したので報告する。いずれもヨーロッパに普通に分布する種類である。

Ectoedemia (Fomoria) weaveri (Stainton) (Nepticulidae) コケモモチビモグリガ (新称) (チビモグリガ科)

幼虫ははじめ表層を線状に潜るが、のちに葉内を斑紋状に食害、最後には絹糸を用いて葉の内部を膨らませて蛹室を作る。そのため、表面はほぼ円形ドーム状になり、裏面はやや平坦。潜葉孔内に黄色の長楕円筒状の繭を作って化蛹、成虫は 7 月に羽化した。日本では今のところ根室地方の湿地帯から知られるのみ。

Phyllonorycter junoniella (Zeller) (Gracillariidae) コケモモキンモンホソガ (新称) (ホソガ科)

幼虫ははじめから葉の裏面を斑点状に潜り、成長とともにそれを拡大してしばしば葉面全体を占める。後に表側をも食害するため不定斑点紋が葉の表面から見える。化蛹にあたって下面を強く収縮させ、上面を屋根型に膨らませて葉の内部に円筒型の蛹室を作る。したがって、葉の下面には 4-5 本の太い皺がある点で上の種類から区別できる。潜孔内で化蛹、7 月に羽化。幼虫は根室地方で発見したが、成虫は北海道中央部の羊蹄山麓 (標高 500 m) でライト・トラップで採れている。

Coleophora glitzella Hofmann (Coleophoridae) コケモモツツミノガ (新称) (ツツミノガ科)

半透明の全層斑紋状の潜葉孔を作るが、裏面には必ず幼虫が潜りこんだ小円形の穴があるか、またはミノがぶら下がっている。この点で上記 2 種の潜葉孔とはっきり区別できる。幼虫のミノは 2 枚の葉片を綴りあわせて作られ、長楕円筒状、上下は角張り、やや扁平である。根室地方の湿原で発

見, 成虫は7月に羽化した.

北ヨーロッパには *Coleophora murinella* Tengström が分布し, やはりコケモモを食害する. この種類は *C. glitzella* にきわめて類似し, 両種の区別は難しいらしい. 今後研究が進めば, ここに発表したコケモモツツミノガの学名が変わる可能性がある.

(Accepted December 8, 1994)